

1 **WE CLAIM:**

- 1 1. A disk drive comprising:
 - 2 (a) a disk;
 - 3 (b) a slider comprising a transducer actuated over the disk for generating a write signal when writing data to the disk and for generating a read signal when reading data from the disk; and
 - 6 (c) a disk controller for generating a pole tip protrusion (PTP) measurement by:
 - 7 writing a first data sequence along a first section of the disk;
 - 8 reading the first data sequence from the first section during a first read operation and generating a first signal measurement;
 - 10 heating the transducer by writing a second data sequence along a second section of the disk preceding the first section, wherein heating the transducer causes at least part of the slider to protrude toward the disk;
 - 13 while the part of the slider is protruding toward the disk, reading the first data sequence from the first section during a second read operation and generating a second signal measurement; and
 - 16 generating the PTP measurement in response to the first and second signal measurements.
- 1 2. The disk drive as recited in claim 1, wherein the first data sequence comprises an alternating sequence of high frequency magnetic transitions and low frequency magnetic transitions.
- 1 3. The disk drive as recited in claim 1, wherein the first and second sections are aligned along a circumferential path.

- 1 4. The disk drive as recited in claim 1, wherein:
 - 2 (a) the first section is aligned along a first circumferential path; and
 - 3 (b) the second section is aligned along a second circumferential path radially offset from
 - 4 the first circumferential path.
- 1 5. The disk drive as recited in claim 4, wherein:
 - 2 (a) the transducer comprises a read element and a write element, wherein the read element
 - 3 is radially offset from the write element; and
 - 4 (b) the disk controller employs a micro-jog value for aligning the read element along the
 - 5 first circumferential path while the write element writes the second data sequence
 - 6 along the second circumferential path.
- 1 6. The disk drive as recited in claim 1, further comprising a read channel comprising write
- 2 gate circuitry for enabling a write gate while writing the second data sequence along the
- 3 second circumferential path.
- 1 7. The disk drive as recited in claim 1, further comprising a read channel comprising read
- 2 gate circuitry for enabling a read gate during the second read operation after writing the
- 3 second data sequence along the second circumferential path.
- 1 8. The disk drive as recited in claim 1, wherein the disk controller:
 - 2 (a) filters the read signal during the first read operation to generate a first harmonic
 - 3 component and a second harmonic component;
 - 4 (b) filters the read signal during the second read operation to generate a third harmonic
 - 5 component and a fourth harmonic component; and
 - 6 (c) generates the PTP measurement in response to the first, second, third and forth
 - 7 harmonic components.

- 1 9. The disk drive as recited in claim 8, wherein the disk controller:
- 2 (a) computes a difference between the first harmonic component and the second harmonic
- 3 component to generate a first value;
- 4 (b) computes a difference between the third harmonic component and the fourth harmonic
- 5 component to generate a second value; and
- 6 (c) generates the PTP measurement by computing a difference between the first and
- 7 second values.

- 1 10. A method of generating a pole tip protrusion (PTP) measurement for a disk drive, the disk
- 2 drive comprising a disk and a slider having a transducer actuated over the disk for
- 3 generating a write signal when writing data to the disk and for generating a read signal
- 4 when reading data from the disk, the method comprising the steps of:
- 5 (a) writing a first data sequence along a first section of the disk;
- 6 (b) reading the first data sequence from the first section during a first read operation and
- 7 generating a first signal measurement;
- 8 (c) heating the transducer by writing a second data sequence along a second section of the
- 9 disk preceding the first section, wherein heating the transducer causes at least part of
- 10 the slider to protrude toward the disk;
- 11 (d) while the part of the slider is protruding toward the disk, reading the first data
- 12 sequence from the first section during a second read operation and generating a
- 13 second signal measurement; and
- 14 (e) generating the PTP measurement in response to the first and second signal
- 15 measurements.
- 1 11. The method as recited in claim 10, wherein the first data sequence comprises an
- 2 alternating sequence of high frequency magnetic transitions and low frequency magnetic
- 3 transitions.
- 1 12. The method as recited in claim 10, wherein the first and second sections are aligned along
- 2 a circumferential path.
- 1 13. The method as recited in claim 10, wherein:
 - 2 (a) the first section is aligned along a first circumferential path; and
 - 3 (b) the second section is aligned along a second circumferential path radially offset from
 - 4 the first circumferential path.

- 1 14. The method as recited in claim 13, wherein:
 - 2 (a) the transducer comprises a read element and a write element, wherein the read element
 - 3 is radially offset from the write element; and
 - 4 (b) further comprising the step of aligning the read element along the first circumferential
 - 5 path using a micro-jog value while the write element writes the second data sequence
 - 6 along the second circumferential path.
- 1 15. The method as recited in claim 10, further comprising the steps of:
 - 2 (a) filtering the read signal during the first read operation to generate a first harmonic
 - 3 component and a second harmonic component;
 - 4 (b) filtering the read signal during the second read operation to generate a third harmonic
 - 5 component and a fourth harmonic component; and
 - 6 (c) generating the PTP measurement in response to the first, second, third and forth
 - 7 harmonic components.
- 1 16. The method as recited in claim 15, further comprising the steps of:
 - 2 (a) computing a difference between the first harmonic component and the second
 - 3 harmonic component to generate a first value;
 - 4 (b) computing a difference between the third harmonic component and the fourth
 - 5 harmonic component to generate a second value; and
 - 6 (c) computing a difference between the first and second values.